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Stick-Slip Motion of the Wigner Solid on Liquid Helium

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Abstract

© 2016 American Physical Society.We present time-resolved transport measurements of a Wigner solid (WS) on the surface of liquid helium confined in a micron-scale channel. At rest, the WS is "dressed" by a cloud of quantized capillary waves (ripplons). Under a driving force, we find that repeated WS-ripplon decoupling leads to stick-slip current oscillations, the frequency of which can be tuned by adjusting the temperature, pressing electric field, or electron density. The WS on liquid He is a promising system for the study of polaronlike decoupling dynamics.

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